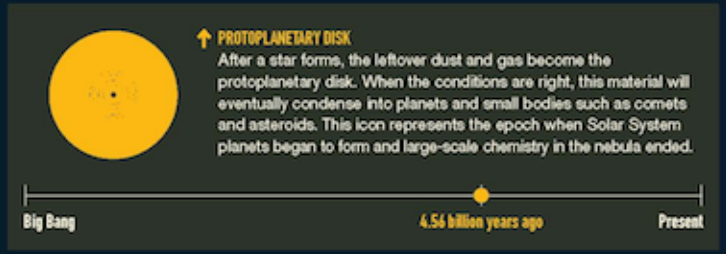
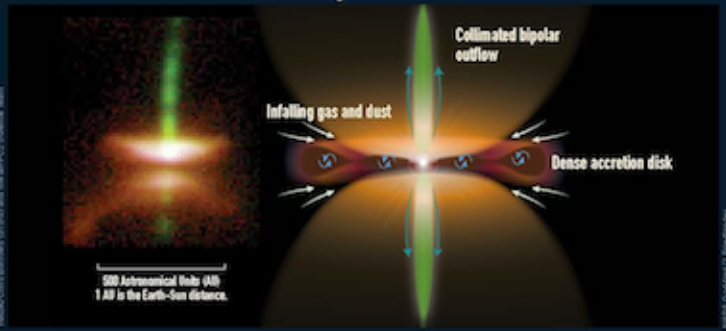
STATION 03 Protostellar 'Factories' Churn Out Chemicals

CHEMICAL ENRICHMENT CONTINUES AS A STAR FORMS: The "Mountains of Creation" (in the interstellar cloud W5) reveal collapsing cloud "cores" where complex chemicals are produced in protostellar nebulae (arrows). The Goddard-built infrared camera on Spitzer Space Telescope took this image.

The star-forming region ("core") is a hot and turbulent place where energetic radiation abounds as X-rays and ultraviolet light. This energy fuels a rich and diverse chemistry that extends the formation of complex organic molecules begun in the interstellar cloud. The legacy chemicals found in primitive Solar System materials reveal this mixed heritage.



Hot and Cold Chemistry



A new protostellar disk is typically flared, as seen in this image and diagram of an edge-on disk. The new star illuminates the disk from within, and jets of material escape along the polar axes above and below. In the hot inner zone, tiny dust grains convert gases into simple organic compounds. Other reactions form carbon dioxide on cold grains in the outer regions, while ionized and neutral gases form new chemicals in regions reached by X-rays and ultraviolet light. Internal forces mix material between the inner and outer disk regions.